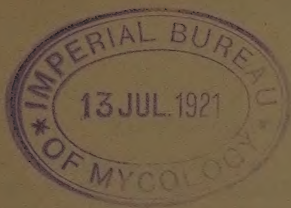


FLORA W. PATTERSON.

THE COMMON DISEASES OF THE PEAR

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G. W. Martin



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NEW JERSEY
AGRICULTURAL
Experiment Stations

CIRCULAR 52

NEW BRUNSWICK, N. J.

NEW JERSEY

AGRICULTURAL EXPERIMENT STATIONS

CIRCULAR 52

The Common Diseases of the Pear.

The commercial production of pears in New Jersey is largely confined to the Kieffer orchards of Burlington and Cumberland Counties, but there are important orchards of this and other varieties in other parts of the State. Very few farms or suburban plots of any extent are without one or more pear trees. It seems wise, therefore, that a circular discussing the diseases of this fruit should describe not only those affecting the commercial varieties, but also those which affect the choicer, if less profitable kinds, grown for household consumption.

Of a large number of diseases of the pear which have been reported from New Jersey or adjacent territory, only the following are of sufficient frequent occurrence to warrant mention.

BLACK SPOT (*Fabraea maculata* (Leu.) Atk. *Entomosporium* stage). This disease is widespread throughout the State and does more damage than is at first sight apparent. It attacks both fruit and leaf. On the leaves, the spots are at first small and red, but soon become larger, and black (Fig. 1). Diseased leaves turn yellow and drop prematurely and a badly infected orchard will sometimes be defoliated three weeks or a month earlier in the fall than would be the case if it were not diseased. On the fruit, the young spot is also small and red and closely resembles scale injury (Fig. 2). It soon becomes larger and darker, and, where the attack is serious, the spots frequently coalesce and the fruit cracks. This not uncommonly happens with the relatively resistant Kieffer (Fig. 2). It is always present to a considerable degree in New Jersey and in the Kieffer orchards frequently causes a considerable premature defoliation in the fall, which is not noticed so much as an earlier attack would be.

TREATMENT: Since the fungous attack comes late in the year, relatively late sprayings are most effective in controlling it. Spray as indicated in the calendar.

BROWN BLOTCH (*Macrosporium sydowianum* Farneti). This, the most serious fruit spot of the Kieffer pear, occurs also on Le Conte, Clairgeau, Pound, Duchess, Lawrence and doubtless on other varieties. It is caused by a fungus which grows in the skin of the pear

and causes reddish brown spots or blotches on the fruit, which often coalesce, forming large, irregular, rusty patches, sometimes covering nearly the entire surface (Fig. 3, 4). Fruit so marked is unattractive in appearance, does not keep well and brings a low price. The disease is especially prevalent on the heavier soils and in orchards where, because of neglected pruning or close planting, the foliage is too dense.

Treatment consists in thinning trees in accordance with good horticultural practice and in rather late spraying; as directed in the calendar.

SCAB (*Venturia pyrina* Aderh). The pear scab closely resembles the apple scab and the two organisms causing these diseases are closely related.

The fungus attacks the fruit causing spots of a slightly different shade of green. The skin over the spot breaks, exposing the fungus which soon becomes black. The spots increase in size and the center becomes rusty or ashy. The diseased fruits are likely to be irregular in shape and in severe cases are slightly cracked. In New Jersey, the Kieffer and Le Conte are ordinarily very resistant, the Bartlett relatively so, and the Sheldon, Duchess and Lawrence very susceptible. On the leaves and young shoots, the fungus forms a velvety coat varying from olive green to black. It is more severe on the under than on the upper surface of the leaf and in severe cases causes the foliage to fall prematurely. The spread of the disease is favored by damp weather at blooming time. If, however, such weather occurs during the summer the spread may be just as easily favored.

Treatment to be successful must be based on the foregoing facts. It is well to postpone the dormant spraying with lime-sulfur until the latest practicable time, i. e., when the clusters separate. A treatment with summer strength lime-sulfur should be made when the blossoms fall, and another two weeks later. Should a period of damp weather occur later, when there is any considerable amount of foliage and fruit not protected by a coating of spray, a further treatment will be desirable.

ASHY LEAF SPOT (*Mycosphaerella sentina* (Fckl.) Schroeter). Like the black spot, this disease is usually described in connection with the imperfect stage of the fungus causing it, in this case a *Septoria*. It attacks only the leaves of the pear and the spots vary from a few to many. The young spots are ashy in the center, surrounded by a black zone and often an outer purplish one. The older spots are a uniform ash gray with a few black dots (fruiting bodies) at the center, and are as a rule markedly angular in outline; these two characteristics making it easy to distinguish them from the commoner and more serious black spot. The disease is common in New Jersey but rarely serious, especially on commercial varieties and the ordinary sprayings readily control it.

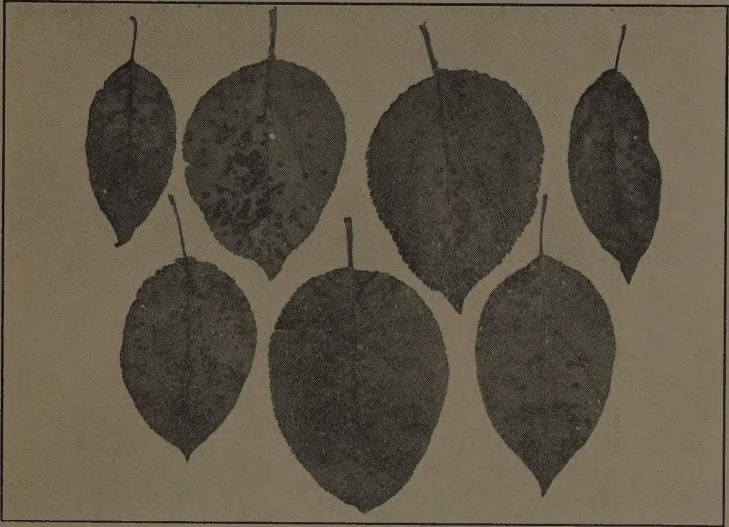


Fig. 1. Black spot on the leaves of the pear

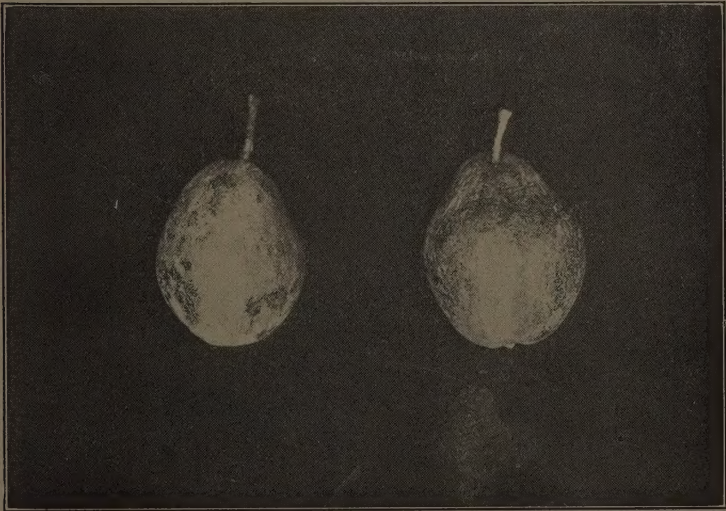


Fig. 2. Black spot. Observe cracking on fruit at right

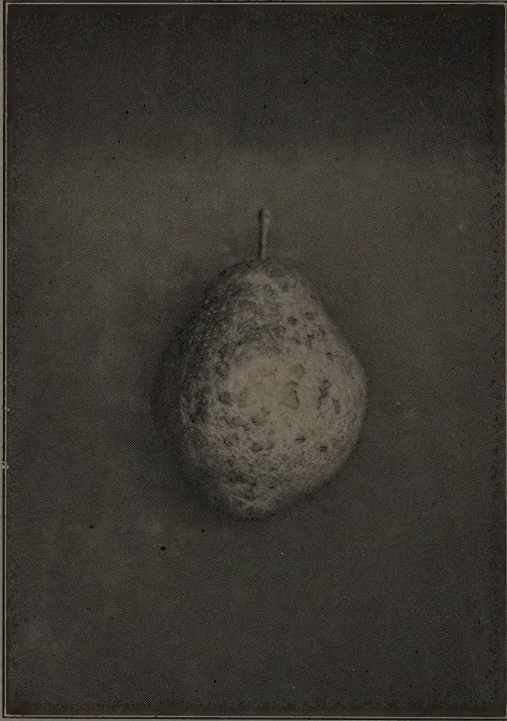


Fig. 3. Brown blotch.

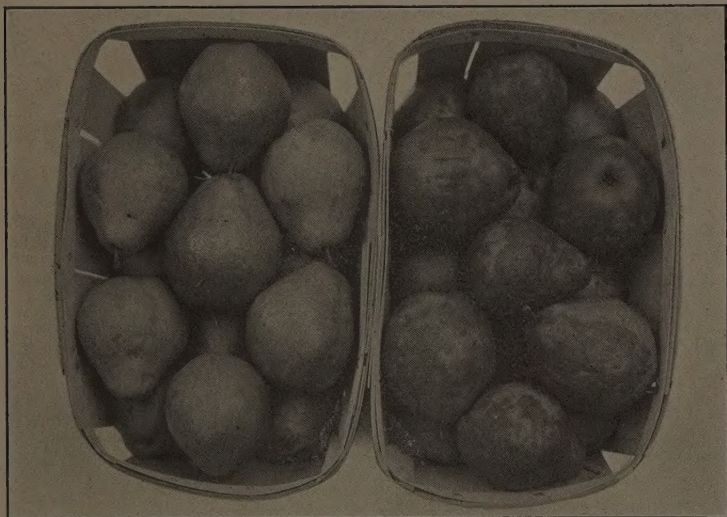
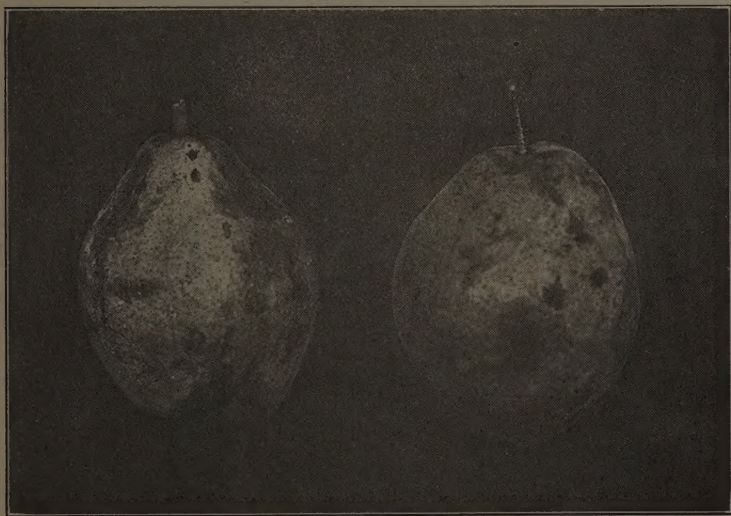


Fig. 4. Results spraying and not spraying for brown blotch.



*Fig. 5. Sooty mould (*Apiosporium*) on Kieffer pears. Growing on psylla exudations.*

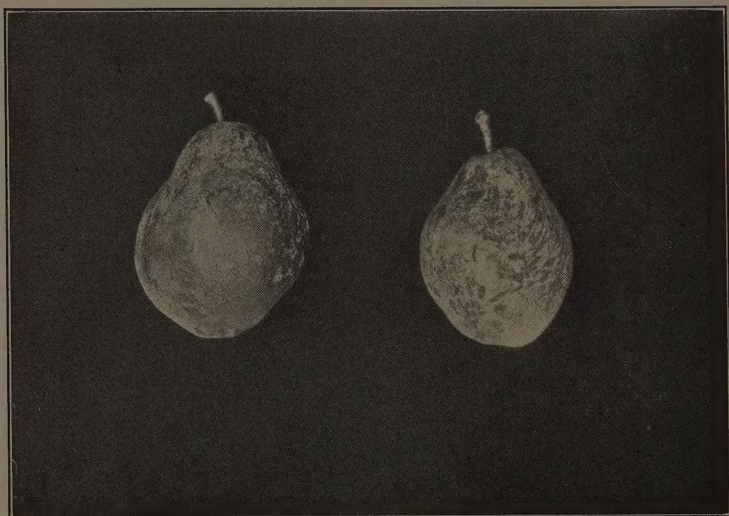


Fig. 6. Copper injury caused by early Bordeaux treatment.

SOOTY MOULD (*Apiosporium* sp.) This fungus forms a purely superficial growth on twigs, petioles, leaves and fruit, subsisting on the honey-dew exuded by the nymphs of the psylla. When the latter is plentiful it may become very serious, not only interfering with photosynthesis on the leaves, but smutting the fruit (Fig. 5) and spoiling its sale. Its appearance is coincident with that of its host and, obviously, its control is dependent upon a control of the psylla.

RUST (*Gymnosporangium globosum* Farl.) This disease occurs occasionally in New Jersey but is rarely important. It is not readily controlled by spraying, but as the fungus has an alternate stage on the red cedar which produces small "cedar apples" it can easily be held in check by pruning these out from the cedars in the vicinity, or, in the case of a commercial orchard, cutting down the cedar trees.

FIRE BLIGHT (*Bacillus amylovorus* (Burr.) De Toni). This is beyond question the most serious disease of the pear, affecting all varieties, some, however, being much more severely attacked than others. It also attacks quinces, and a number of varieties of apples. The most familiar form is the *twig blight*, when the ends of many of the twigs will be seen to be blackened and curled up. This form of the disease does not live over winter in many cases, but frequently a twig or water sprout is found in which the disease has travelled down to its junction with the trunk or a main limb, where a canker or *body blight* area is formed, appearing as a darkened and sunken spot on the bark, sometimes girdling the limb or trunk. Body blight cankers may also be caused by infection of wounds in the bark. The organism causing the disease frequently lives over the winter in these body cankers and occasionally in dead twigs. In the spring these cankers frequently produce a sticky, whitish exudation containing millions of the bacteria. This exudation is very attractive to insects by which it is carried to the blossoms, causing an infection resulting in the *blossom blight* which kills the blossoms and young leaves. This is frequently followed by the *fruit blight*, which causes the fruit to blacken and shrivel, and can usually be traced to this source of blossom infection.

There is a considerable difference in the susceptibility of different varieties to this disease. Kieffer and Duchess are relatively resistant, while Bartlett and Le Conte are as a rule very susceptible. Among apples, Starr, Smith Cider and Yellow Transparent may be mentioned as particularly liable to attack.

Spraying is of no value as a control measure, but the following practices as recommended in Circular 44 of this Station will hold the disease in check:

1. "Winter prune and burn all diseased twigs, being careful to cut well back of the disease. These twigs can be recognized by the fact that the leaves usually cling to them after the leaves have

fallen from the healthy twigs.

2. "Cut out the canker and burn. Paint the wound with corrosive sublimate (1 part in 1,000 parts of water) or with 5 per cent formaldehyde solutions, which can be obtained at any drug store. When dry, paint with white lead paint or coal tar.

3. "During the summer cut out and burn the blighted tips as soon as possible. This may be impracticable in large orchards when the disease is exceptionally severe.

4. "Keep the water sprouts and very young spurs rubbed from the trunk and large branches. When they become infected the disease works in and causes the body blight cankers.

5. "Do not over-prune the trees. Develop open or spreading crotches.

6. "Do not over fertilize. Avoid rich, nitrogenous fertilizers. Phosphoric acid is valuable; it tends to harden the new growths.

7. Remove or treat the neighboring wild crab, hawthorn and other trees which carry the disease and persuade your neighbors to cut it out of their trees. Neighborhood cooperation is almost essential for control.

8. Frequently dip the pruning knife in 5 per cent formalin to destroy such germs as may cling to it.

9. Do not set a tree showing any sign whatever of the disease.

CROWN GALL (*Pseudomonas tumefaciens* Smith & Townsend). This disease appears as a large, knotty swelling, usually at the junction of the stem and roots, but frequently lower down on the roots and sometimes higher up on the trunk or branches, in which latter case it is known as the aerial form, and is somewhat modified in appearance. It attacks most of the commonly grown fruit trees and berry plants, as well as a large number of other plants. As the organism produces threads of diseased tissue which run considerable distances from the external gall, cutting off the latter is of little value since the disease quickly breaks out again at another point. Furthermore, since the organism attacks such a great variety of plants, many of them common weeds, it is practically impossible to get rid of it, once it is established in the soil.

The importance of the disease varies greatly not only with different plants, but with different varieties of the same plant. In some instances it appears to do little or no harm, while in others it very evidently interferes with proper nutrition of the host plant. Even when it seems to be doing little harm, it is opening the way for other, more destructive agencies, or weakening the trunk so that a heavy wind will more easily destroy the tree.

Another form of the disease, common on the apple but apparently much less so on the pear, is hairy root. This type appears as a dense tangle of roots arising from a flat, callous-like gall.

Both galls and hairy root may be caused by other agencies, among which may be mentioned improper wrapping of graft and

cion, by heavy applications of nitrogenous fertilizer and by the woolly aphid, but the parasitic form can always be recognized by an experienced observer.

Since no treatment can reach a disease of this nature, in view of its sometimes serious effects, no one can afford to introduce it into his ground, and the only safe remedy is to be sure that all nursery stock planted is absolutely free from it. If in doubt, do not plant suspected trees, but heel them in and send a specimen to the Experiment Station for examination and report.

SPRAY INJURY. This trouble, as its name implies, is due to improper spraying. It is most commonly seen as the familiar russetting (Fig. 6), but frequently takes the form of enlarged and roughened lenticels. A slight amount of spray injury is sometimes unavoidable under particular weather conditions and is far preferable to fungus attack, but this amount can be reduced to a minimum. Three precautions may be suggested. (1) Use good pressure and a nozzle throwing a fine mist, so as to cover every part of the plant without drenching any part. One of the commonest sources of trouble is to leave drops of spray material on the leaves through which the sun acts as a lens, and which on evaporation leaves a concentration of poison. (2) Spray with the proper materials and at the right time. The recent work with pears in New Jersey has brought out the fact that Bordeaux mixture, while more efficient as a fungicide than lime-sulfur, so far as pears are concerned, is also more dangerous to the tree, but that its principal damage is done in the early sprayings. Hence, it is advisable to use lime-sulfur for the early treatments, when fungous attacks are weaker and foliage and fruit tender, and Bordeaux for the mid-summer treatments, when brown blotch and black spot are making their attack, and foliage and fruit are harder and more resistant to the effects of the spray. (3) Do not spray unnecessarily. In view of the very general neglect of necessary sprayings, especially in small plantings, this advice may seem superfluous, but it is a fact that certain growers spray because it seems to be the proper thing to do, without any very clear idea of what they are spraying for. Spraying is a necessary evil at best, and the securing of best results as well as ordinary business sense demand a clear understanding of the reason for every treatment.

PINK ROT (*Cephalothecium roseum* Cda). This is a storage rot, securing entry to the fruit through any injury to the skin. It is especially common following scab ruptures and the writer has collected badly scabbed pears which while still on the tree, showed a luxuriant growth of the pink rot organism in the cracks caused by the scab fungus. When scab and black spot are controlled and the fruit is handled with reasonable care, this disease gives no trouble.

WINTER INJURY is sometimes caused by very cold weather setting

in before the trees have stopped growing. Where this is likely to occur any horticultural practice which will check growth in time to harden the wood thoroughly before danger of severe frost, will tend to prevent such injury.

Spray Calendar for Pears.

This spray calendar has been approved by T. J. Headlee, Entomologist, M. A. Blake, Horticulturist and Mel. T. Cook, Plant Pathologist, of the New Jersey Agricultural Experiment Station.

TIME	MATERIAL	FOR
1. As cluster buds begin to separate	Commercial concentrated lime-sulfur, 1 part in 9 parts water; or home-made concentrated lime-sulfur diluted to a specific gravity of 1.03 plus 3 lbs. arsenate of lead paste (not less than 15% arsenic oxide) to 50 gals.	San José Scale, psylla eggs, curculio, scab and other fungi.
2. Directly after petals fall.	Commercial concentrated lime-sulfur 5 qts. in 50 gals. water, or home-made concentrated lime-sulfur diluted to specific gravity 1.007 plus 3 lbs. arsenate of lead paste (not less than 15% arsenic oxide).	For Scab, codling moth, curculio, and leaf chewers generally. For pear psylla use "black leaf 40" at rate of $\frac{3}{4}$ pint to 50 gals.
3. Ten days after the blossoms fall.	Same as 2.	For codling moth fungus diseases, curculio and leaf chewers generally.
4. June 20th to 30th for all fall and winter varieties.	Same as 2 or substituting 3-4-50 Bordeaux mixture for the lime-sulfur.	For codling moth, leaf chewers, brown blotch, black spot.
5. July 20th to 30th for all fall and winter varieties.	Same as 4, omitting Arsenate of Lead.	For brown blotch and black spot.

For treatments 4 and 5 the Bordeaux mixture has given slightly better results than lime-sulfur, but it is possible that it may occasionally produce slight injuries.